The W4KDA Loop Skywire

“One Antenna to Rule Them All”

by

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Loop Skywires

- Full wave horizontal loop
- Multi Band
- Omni Directional
- Resonant on even harmonics
- Horizontal polarization
“If I could only have one HF antenna, it would be a loop skywire.”
WARNING:
There is no such thing as a perfect antenna.
W4KDA's Original Build

- 160m long
- 529' of 18 AWG stranded wire
- \( L = \frac{1004}{f} \)
- 20 – 50' off the ground
- Simple coax to wire break out (no BALUN)
- "Tuner" at the radio
- This is the way most hams install and use their loops
- Worked "okay" at best
Analysis

- Checked it with MFJ269 analyzer
- Resonant on 160, 80, 40, 20, 12, 10m
- 12m resonance was unexpected
- $Z/\Theta$ impedances were 8 to 129 ohms, none near 50
- No impedance “curve” - $Z$ went up and down randomly by band
- Impedance did not match any coax or ladder line
- No single gamma match or matching stub network could make the impedance match on all bands
- Major losses due to SWR
Current Design

- Moved the tuner to the loop (more later)
- Installed 1:1 BALUN
- 50 ohms from radio to loop
- Reduces losses due to SWR
- Also installed duplexers (more later)
- Huge Difference in antenna performance
- Now the loop has “big ears”
- Now it works on 15m, 17m, 30m, 60m too!
Advantages

• You can work [almost] everyone you can hear
• You can hear exceptionally well
• Quiet, naturally noise canceling
• Inexpensive
• Nearly invisible – *stealth*
• Easy to construct and install
• A mix of NVIS and DX lobes (more later)
Disadvantages

- Large, although you can go *around* a house
- Omni directional, so you cannot get away from stations you do not wish to hear
- Example: Could not hear North American amateurs over AM & FM broadcast stations on 40m until recently
- Fragile as any other wire antenna, but a much larger target
LDG Z-11 Pro in NEMA Box
W4KDA Antenna System Connection Diagram

- 6m, 2m, 70cm
- Tuner
- Duplexer
- 6m+
- 10m-
- LMR400
- Duplexer
- HF-6m
- 2m/70cm
- Transciever
- 160m Skywire
- 160m-70cm
- 1:1 BALUN
Lobes

- Has energy low toward to the horizon (DX)
- Has energy high toward the zenith (NVIS)
- “Strange” lobe pattern and changes somewhat by band
- 10 – 20m are very DX oriented
- 40 – 160m have more NVIS
- On 80m the W4KDA loop has complete coverage of the country with no skip zone
Gain

- ~ 2.1 dBi of gain for a square
- ~ 1.1 dBi in a triangle
- A perfect circle shows ~ 1 dB gain over a square
- No concave corners – loop shape must be convex
Results

- Worked K5D and PJ2T with ease
- Hardly ever have to call more than 3 times
- Break most pile ups on 1\textsuperscript{st} or 2\textsuperscript{nd} try (barefoot)
- Worked many DX stations on 17m
Web URLs for More Information

- Dr. Ace:
  http://www.bloomington.in.us/~wh2t/loop.html
- Dave Fischer W0MHS:
  http://srgproperties.inetusanow.net/files_custom/9467_2192.pdf
- Yahoo Skywires Group:
  http://groups.yahoo.com/group/Skywires/